

REMARKS

Claims 8-14 are all the claims pending in this application. Claims 1-7 and 14 have been canceled and claim 8 has been amended. Support for amended claim 8 can be found, for example at page 8, lines 33-34, at page 14, lines 14-17 and lines 27-31 and at page 16, line 32 to page 17, line 3, of the present specification. Applicants reserve the right to file a continuation/divisional application directed to the cancelled subject matter.

Entry of the above amendments is respectfully requested.

Initially, it is noted that Applicants' claim to foreign priority under 35 U.S.C. § 119 has not been acknowledged and that receipt of the certified copy of the priority document not been confirmed. In addition, Applicants' claim to domestic priority (provisional application) and receipt of the translation of the provisional application have not been acknowledged.

Accordingly, the Examiner is respectfully requested to acknowledge Applicants' claims to both foreign and domestic priority, and to confirm receipt of the certified copy of the priority document and the translation of Provisional Application No. 60/247,991, filed July 10, 2001.

I. Response to rejection of Claims 1-13 Under 35 U.S.C. § 102(a)

On page 2 of the Office Action, claims 1-13 are rejected under 35 U.S.C. § 102(a) as being anticipated by Onomura et al. (U.S. Patent 6,067,309).

Applicants respond as follows.

The present invention relates to a method for producing a p-type gallium nitride-based compound semiconductor comprising producing a gallium nitride-based

semiconductor layer doped with a p-type impurity, producing a catalyst layer on the gallium nitride-based compound semiconductor layer, annealing the gallium nitride-based compound semiconductor layer fixed with the catalyst layer in an atmosphere gas containing no oxygen, completely stripping the catalyst layer, and providing a p-side electrode on the p-type layer after annealing. In this manner, the catalyst layer can be removed without causing any damage on the surface, and as a result, good ohmic contact can be realized with an electrode that is formed on the surface after removal of the catalyst layer (*see* page 18, lines 5-8).

Onomura relates to a method of forming a semiconductor light-emitting device. Onomura discloses a semiconductor device, in which a p-type GaN layer is formed, then a Pt layer is formed on the p-type GaN layer, and the entire substrate is thermally treated in a nitrogenous atmosphere at 350 ° (*see* col. 5, lines 47-61 and col. 6, lines 37-38). In addition, Onomura discloses that the Pt works as a catalyst, and hydrogen and carbon elements are removed from the film, and as a result, acceptor concentration is increased and an activation ratio of Mg becomes substantially 100% (*see* col. 6, lines 47-54). Onomura discloses that the metal layer is not limited to Pt, but can be another metal layer, such as Pd or Ni (*see* col. 13, lines 11-13).

The Examiner takes the position that the metal layer of Pt or Ni of Onomura would be stripped to form a metal pattern. Although Onomura discloses etching the layers to expose a n-type GaN contact layer, Onomura does not disclose stripping of the Pt layer. In addition, since the Pt layer serves as an electrode, contrary to the Examiner's assertion, the Pt layer would not be stripped. Therefore, there is no technical motivation in Onomura for one of ordinary skill in the art to strip the entire Pt layer, which forms the base of the p-type electrode.

In addition, in the process of the present invention, the annealing step is conducted before addition of a bonding pad and/or electrodes. In contrast, Onomura discloses thermal treatment of the entire substrate (i.e., after formation of various electrodes).

Additionally, as required by amended claim 8, the annealing step is conducted in an atmosphere gas containing no oxygen. Although, Onomura et al. teaches annealing in a nitrogenous atmosphere (column 6, lines 37-38), this is not necessarily an oxygen-free atmosphere. Furthermore, Onomura et al. did not recognize the advantages of annealing in an atmosphere gas containing no oxygen. As discussed in the present specification with reference to Example 1B, when annealed in nitrogen containing 10% oxygen (page 11, lines 33-34 of the specification), despite a sufficiently high carrier concentration, Ni oxide or Ga oxide is present on the surface of the p-type layer due to generation of contamination such that the morphology and contact property are damaged (page 13, lines 1-5 of the specification). None of this is disclosed by Onomura et al.

In view of the above, it is respectfully submitted that Onomura fails to teach or suggest the present invention. Accordingly, withdrawal of the foregoing rejection is respectfully requested.

II. Response to rejection of claims 1-13 under 35 U.S.C. § 102(a)

On pages 2-3 of the Office Action, claims 1-13 are rejected under 35 U.S.C. § 102(a) as being anticipated by Ota et al. (U.S. Patent 6,235,548).

Applicants respond as follows.

Ota relates to a method of fabricating a nitride semiconductor laser device of a group III nitride semiconductor. Ota discloses that a nickel layer is formed on a p-type GaN layer (110) and that the Ni film is locally removed through wet etching (*see* col. 10, lines 51-52 and lines 60-64; Fig. 6). Ota also discloses that after various etching steps using the Ni layer as a mask, the wafer is subjected to thermal treatment.

Although Ota discloses etching of the Ni layer, the Ni layer is not completely removed since it serves as part of an electrode.

Therefore, similar to Onomura, there is no technical motivation in Ota for one of ordinary skill in the art to strip the entire Ni layer, as in the present invention.

Accordingly, it is respectfully submitted that Ota does not teach or suggest the method of the present invention. In view of the above, withdrawal of the foregoing rejection is respectfully requested.

III. Conclusion

In conclusion, the §102 rejections should be overcome, and in view of the above, it is respectfully submitted that the claims are in condition for allowance.

Reconsideration and withdrawal of the rejections are respectfully requested, and allowance of claims 8-13 at an early date is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

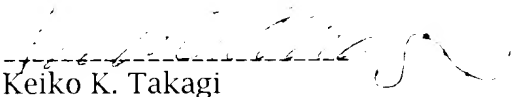
AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Application No.: 09/900,962

Attorney Docket No.: Q61744

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Date: February 12, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 1-7 and 14 have been canceled.

The claims are amended as follows:

8. (Amended) A method for producing a gallium nitride-based compound semiconductor light-emitting device comprising providing an n-type layer and a light-emitting layer each comprising a gallium nitride-based compound semiconductor, [and] providing a p-type layer comprising a gallium nitride-based compound semiconductor through the following steps:

producing a gallium nitride-based compound semiconductor layer doped with a p-type impurity;

producing a catalyst layer comprising a metal, alloy or compound on said gallium nitride-compound semiconductor layer;

annealing the gallium nitride-based compound semiconductor layer fixed with said catalyst layer in an atmosphere gas containing no oxygen; [and]

stripping said catalyst layer completely; and
providing a p-side electrode on said p-type layer after annealing.